MULTIMEDIA UNIVERSITY

STUDENT ID NO

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# MULTIMEDIA UNIVERSITY

# FINAL EXAMINATION

**TRIMESTER 1, 2016 / 2017**

## TLD 7011 – LOW-LEVEL DESIGN OF SOFTWARE

( All sections / Groups )

14 OCTOBER 2016
8:00 P.M. – 10:00 P.M.
( 2 Hours )

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**INSTRUCTIONS TO STUDENTS**

1. This Question paper consists of 5 pages (including cover page) with 5 Questions only.
2. Attempt **ANY FOUR** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please print all your answers in the Answer Booklet provided.

**Question 1** (2 + 4 + 4 marks)

a) Explain, with the help of a diagram, the concept of *interleaved concurrency*.

b) A sparse matrix A is to be multiplied by vector b, as shown in Figure 1 . Draw the corresponding Task Interaction Graph.

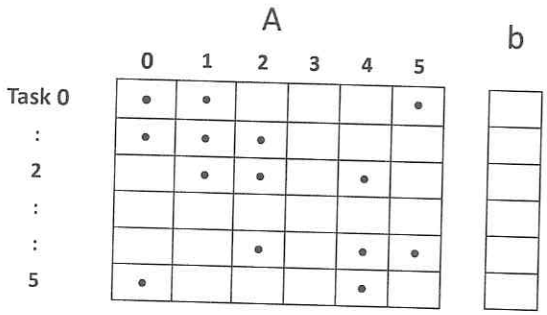


Figure 1

c) What is *exploratory decomposition* of a problem? Explain using a sliding puzzle game given in Figure 2.

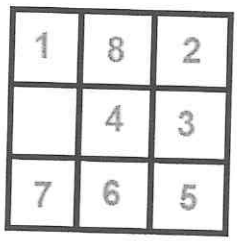


Figure 2

**Continued ...**

**Question 2** (3 + 4 + 3 marks)

a) Change the following class so that the fields are self-encapsulated.

```
public class Rectangle {
   private int height, width;

   public int area()
   { return height * width;}
}
```

b) Refactor the following classes to reduce duplication of fields and methods.

```
public abstract class Vehicle {
   public string Registration_No;
}

public class Car : Vehicle {
   private string Owner_Name;
   public boolean automatic;

   public string getOwner()
   { return Owner_name;}
}

public class Motorcycle : Vehicle {
   private string Owner_Name;
   public boolean hasSideCar;

   public string getOwner()
   { return Owner_name;}
}
```

c) Explain why some data values in classes need to be replaced with objects. Illustrate with an example.

**Continued...**

**Question 3** (3 + 2 + 2 + 3 marks)

a) Explain the problem in the following code snippet and rewrite the code to improve its efficiency.

```
Found = false;

for ( i = 0; i < arraylength; i++ ) {
   if ( array[ i ] == searchValue ) {
      Found = true;
   }
}
```

b) Explain how we can reduce the total iterations of the following loops:

```
for ( c = 0; c < 200; c++ ) {
   for ( r = 0; r < 10; r++ ) {
      total = total + array[ r ][ c ];
   }
}
```

c) You observed the following statement in a program.

```
a = b + (c / d) - e * (c / d) + f * (d / c);
```

Tune the code above into a more efficient code by eliminating common subexpressions.

d) Rewrite the following code snippet to improve the efficiency of the program.

```
for ( i=0; i<count; i++) {
   balance[i] += purchase->allocator->indiv->borrower;
   amounttopay[i] = balance[i]*(prime+card)*pcentpay;
}
```

**Continued...**

**Question 4** (2 + 6 + 2 marks)

MyNetworks Sdn Bhd is a network design company that is developing an application to help their engineers design networks for their customers. The tool is used to determine the network components to be installed in different rooms at the customers' offices. A key feature of the tool is the selection of the components, where for each type of component there are a few options in terms of features such as colour and size. Due to cost considerations, once an option is selected, all the components would be changed to the selected options in all the locations.

(a) Explain why a *Prototype* design pattern would be suitable for this application.

(b) Draw the class model that implements the *Prototype* design pattern for this application.

(c) Is this a Delegation or Recursion form of design pattern? Explain your answer.

**Question 5** (2 + 4 + 4 marks)

XP Sdn Bhd is a software solutions company which adopts Extreme Programming in their software engineering activities. Programmers in this company work in pairs and to ensure quality in the software products, formal inspections are conducted as part of the software process.

a) Describe ANY TWO design practices in agile approaches for software engineering.

b) Explain ANY TWO benefits of pair programming.

c) Who are the participants of a formal inspection? Briefly describe ANY FOUR roles in a formal inspection.

**End of Page**